DOCUMENT RESUME

ED 215 779 PS 012 821

AUTHOR Kilbourne, Brock K.; Ginsberg, Gerald P.
TITLE Infant-Mother Vocalization Patterns: A Replication and Extension.
PUB DATE Apr 82
NOTE 18p.; Paper presented at the Annual Meeting of the Western Psychological Association (62nd, Sacramento, CA, April 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Attention; Child Development; Comparative Analysis; *Infants; *Language Acquisition; *Language Patterns; Language Research; Longitudinal Studies; *Mothers; *Oral Language
IDENTIFIERS Alternation (Speech); Coaction (Speech); *Vocalization

ABSTRACT

This study reports a replication of an earlier study by Kilbourne and Ginsberg (1980) which indicated the occurrence of a transition from predominantly coacting to predominantly alternating infant-mother vocalization patterns. In addition, the present study examined the modulating influences of nursing activity and mother's focus of attention upon the developmental emergence, if any, of vocal alternation. Coaction was operationalized as the occurrence, within each session, of overlapping infant-mother vocalizations. Alternation was operationalized as infant vocalization(s) occurring between the offset of the mother's initial vocalization and the onset of her next vocalization without overlap with her infant's vocalization(s). One normal male infant was observed from 10 days of age until the 22nd week of life. A 3/4 inch color television camera was employed to tape a routine cycle of activity, usually on a semi-monthly basis. Each session taped consisted of 20 minutes of filming of both play and feeding periods. Upon completion of the observation period, the video tapes were replayed and viewed by one trained observer. An Esterline Angus Event Recorder, with electric pens that were operated by finger switches, was used to code onsets and offsets of vocalizations, as well as duration of (1) all infant and mother vocalizations; (2) feeding activities; and (3) mother's attentional focus (i.e., whether she was attending primarily to her baby). In general, results from the present study replicated the results obtained in the earlier study. In both studies the performance of alternation emerged during the fourth month, suggesting a clear and apparently stable change from a predominantly coacting pattern of infant-mother vocal interactions to a predominantly alternating pattern. This stable change to alternation was not found to be an artifact of nursing activity or the mother's attentional focus. (Author/MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED215779

Infant-Mother Vocalization Patterns: A Replication and Extension

Brock Kilbourne and Gerald Ginsberg

Department of Psychology

University of Nevada, Reno

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Paper presented at the 62nd Annual Meeting of the Western Psychological Association, Sacramento, California, April, 1982.

Not for reproduction, quotation, or any other use without permission of the authors.

PS012821

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Brock K. Kilbourne

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Abstract

The present study replicated an earlier study by Kilbourne and Ginsburg (1981) which indicated a transition from predominantly coacting to predominantly alternating infant-mother vocalization patterns. Alternation emerged at 10 days in one infant-mother pair, predominated at 16.5 weeks, and progressed developmentally across the 5 month period of the study. This stable change to alternation was not an artifact of nursing activity or the mother's attentional focus. In conclusion, the present findings and approach were related to: 1) the onset of protoconversational turn-taking in the young infant; and 2) other structural analyses in this country and Europe.

Infant-Mother Vocalization Patterns: A Replication and Extension

In a ground breaking study on infant-mother vocalization patterns, Stern, Jaffe, Beebe, and Bennett (1975) found that mothers and their 3-4 month old infants have two structurally different modes of vocalizing with each other. The predominant mode, coaction, consisted of the simultaneous vocalizations of the infant mother pair and was generally found to be associated with high levels of arousal. The second mode, alternation, was characterized by nonoverlapping patterns of turntaking vocalizations between the infant-mother pair and was generally found to concentrate at moderate levels of arousal. Both patterns emerged in the data even though coaction was predominant and appeared to concentrate around high levels of positive affective arousal while alternation more commonly occurred during mid-levels of arousal. Stern et al also speculated that alternation would be the predominant pattern of vocalization by sometime during the baby's second year, tied to the development of verbal comprehension (p.96).

Building upon this initial work of Stern et al, Beebe, Stern, and Jaffe (1978) reported evidence indicating a similar pattern of coaction and alternation in the temporal patterning of kinesic behaviors. Beebe et al contended this similar distinction between coaction and noncoaction in the kinesic realm suggests that the temporal patterning of activities is more important than the actual modality of stimulation. Some evidence was collected indicating the differential temporal organization of behavior during coactive and noncoactive episodes. For instance, during coactive sequences both mother and infant elongated their onset times and matched onsets closely, and the mother tended to match her infant's durations. In noncoactive sequences, infant and mother gen-

erally tended to match their kinesic rhythms in "behavior pause cycles." Beebe et al concluded: 1) rhythmic expectancies were apparent in both modes; 2) rhythm matching may conceivably presage the matching found in adult conversation; and 3) their findings further indicate the similarity of vocal and kinesic behavior patterns in protoconversation.

Jaffe and Anderson (1978) have recently made use of these findings in their suggestion that conversation grows ontogenetically out of the rhythmic alternation of behaviors between the mother and her infant. Switching pauses in noncoactive episodes are thought to be analogous to switching pauses in adult conversation. Interestingly, this interpretation is compatible with the recent work by Bruner (1975) and his group on the interactional antecedents of language acquisition. Bruner contends that what may be innate about language acquisition is not linguistic ability per se but some special features of human action which permit language to be decoded. In other words, knowledge of the requirements of action may help us crack the linguistic code. Bruner believes this may be most evident in the isomorphism between the linguistic form and the nature of human attention processing, and in the hypothesized correspondence between linguistic case structure and the organization of action.

Although Stern et al examined the fourth month of the infant-mother pair in detail and found both coactive and alternating vocalization patterns, they found no evidence of a transition to predominantly alternating patterns as the infant matured, and, as mentioned earlier, suggested alternation would become dominant only in the second year. However, we recently (Kilbourne and Ginsburg, 1981) found a transition from predominant coaction to predominant alternation vocalization patterns in a longitudinal study of one infant-mother pair from approximately 3 1/2 to 13 1/2 months of age.

Transition to alternation occurred at approximately 4 1/2 months and progressed developmentally. More specifically, we found that the proportion of alternating vocalizations to the total number of vocalizations was low at approximately 3 1/2 and 4 months (i.e., .25 and .36), but jumped to .77 at approximately 4 1/2 months, and held steady or slightly above that level to the thirteenth and 1/2 month. Our study did not examine, however, the infant's first 3 months of life and therefore could not provide any information about the developmental changes in vocalization patterns during this early period.

But it is important to note that our study did reveal the emergence of a predominance of an alternating vocalization pattern during the fourth and 1/2 month of life (17.6 weeks), and that this pattern remained predominant through the thirteenth and 1/2 month when our study ended. Thus, our data was inconsistent with those of Stern et al if we only compare our data at 4 1/2 months with theirs at 3-4 months (but not if we compare their findings with our findings at 3-4 months), and with their speculation that alternation would not become predominant until some time in the second year. On the other hand, our finding was compatible with Bruner's argument (1975) and with the basic thrust of Stern's work that discourse skills have their roots in the protoconversational character of early mother-infant interactions.

It was important, then, to replicate our basic finding, since it was inconsistent with the Stern et al predictions concerning when alternation should predominate and because it was based on only a single dyad. Moreover, there had been a change in recording settings at approximately 4 1/2 months which conceivably could have accounted for the sudden emergence of alternation, although we had been able to control for that change statistically. It also was important to begin our observations earlier in the history of the dyad, since the very low levels of alternation which we found in our first two recording sessions might have been a temporary fluctuation or reflective of the novelty of the recording procedure.

Our present study, then, constitutes an attempt to replicate our initial discovery of a transition to a predominance of alternation in the infant-mother vocalization patterns, and to extend our initial observations backward to the very early stages of infant-mother interaction. Also, the present study examines the modulating influences of nursing activity and mother's focus of attention upon the developmental emergence - if any - of vocal alternation.

Methods

One normal male infant was observed from 10 days of age until the 22nd week of life. The mother and father were white, middle-class, and Mormon. There were 7 children in the family, ranging to age 17. Five were female and 2 male, including the infant. One camera monitored the course of the interaction between the infant-mother pair over the twenty weeks of the study.

A 3/4 inch color video was employed (a Panasonic color T.V. camera, NV-3700) to tape a routine cycle of activity on basically a semi-monthly basis, with weekly recording sessions during certain intervals of expected rapid change. Video taping began in mid-February, 1981 and is still continuing, but the data have been coded and analyzed only through early July (with the exception of 3 later recording sessions of the infant's first year of life). Each session consisted of twenty minutes filming of whatever play and breast feeding behaviors emerged. Thus, each session consisted of both play and feeding periods. No attempt was made to structure either play or feeding behaviors or to limit the amount of time.

The video tapes were replayed in the laboratory and viewed by one trained observer. An Esterline Angus Event Recorder, with electric pens that were operated by finger switches, was used to code onsets, offsets and durations of 3 variables: 1) all infant and mother vocalizations; 2) feeding activity; and 3) mother's attentional focus (i.e., whether she was attending primarily to her baby).

One trained graduate student recorded the three independent measures on each of two occasions, and the order of all tapes was randomly selected for coding. A test-retest reliability check for the above measures at time 1 and time 2 indicated the following: 1) alternation, .97; 2) coaction, .94; 3) feeding activity, .99; and 4) attentional focus, .98.

Identical to an earlier report by Kilbourne and Ginsburg (1981) on the vocalization patterns of the infant mother pair, the comparison of the infant's and mother's vocalizations constituted the raw data in the present study. Coaction was operationalized as the occurrence, within each session, of overlapping infant-mother vocalizations. Alternation was operationalized as infant vocalization(s) occurring between the offset of the mother's initial vocalizaton and the onset of her next vocalization without overlap with her infant's vocalization(s) (using the infant's offset to onset times produced approximately the same number of alternations and a test of the different between these two ways of coding alternation was nonsignificant $F=.49$, $p=.49$). A mean alternation score and a mean coaction score were computed for the two ratings for each session , and then a ratio of those mean scores was computed, (i.e., the mean number of alternations for each session in relation to the mean total number of all vocalizations, both alternations and coactions). The mean ratio score per session (ratio of alternation vocalizations to total vocalizations) was used to examine the early developmental trend in the infant's vocalization patterns.

Results

It is evident that as early as 10 days of age (i.e., 1.5 weeks) that 41% of the infant-mother vocalizations consisted of alternating vocalizations. The

actual proportion of alternations to total vocalizations steadily increased from about 10.5 weeks on with the sharpest increase of this trend between 13.5 and 16.5 weeks. Alternation emerged as the predominant mode of vocalization by 16.5 weeks of age (mean ratio = .76) and peaked at 18.5 weeks (mean ratio = .81) for the young infant. Figure 1 shows this developmental trend in the infant-mother vocalizations in relation to the findings of the first study.

Insert Figure 1 About Here

A series of standard regression analyses were computed in order to examine the developmental trend of the vocal alternation pattern over the first five months of the infant's life. Age (in weeks) was used as the developmental index, and explained 68% of the ratio scores ($F=22.82$, $p<.001$). Table 1 shows the relevant R^2 values for the series of regression equations.

Insert Table 1 About Here

In order to assess the modulating influence of the mother's attentional focus and dyadic activity upon the vocalization patterns, a series of partial correlation coefficients were computed. The partial correlation coefficients indicated the relationship of alternation with feeding activity and the attentional focus of the mother was spurious when controlling for age ($r=.33$, $p=.14$ and $r=.08$, $p=.40$ respectively). However, the relationship between alternation and age, when controlling for both feeding activity and attentional focus, remained significant ($r=.69$, $p=.01$), although it was modestly reduced in strength. Specifically, the percentage of variance in alternation explained by age dropped from 68% to 47% when activity and attention were partialed out. Table 2 shows the series of partial correlation coefficients computed and each partial correlation squared.

Insert Table 2 About Here

Also, a follow-up inspection of the ratio scores on the 33rd, 43rd and 50th weeks (i.e., approximately 8 1/4, 10 3/4, and 12 1/2 months) indicated the high level of alternation was generally maintained. These ratio scores were: .70, .69, and .67 respectively (the interrater reliability coefficient for coactions and alternation, using two raters, was .96).

Discussion

The present study replicates our prior finding of a transition from a predominantly coacting infant-mother vocalization pattern to a predominantly alternating vocalization pattern, using a second infant-mother pair in a different recording setting. In both the early study and the present one, the predominance of alternation emerged during the fourth month. In the first study, predominant alternation emerged by 17.6 weeks (mean ratio = .77) while in the replication study predominant alternation emerged by 16.5 weeks (mean ratio = .76). Thus, both studies reveal a clear and apparently stable change from a predominantly coacting pattern of infant-mother vocal interactions to a predominantly alternating pattern, although the transition was not as sharp in study 2 as in study 1.

Furthermore, the present study suggests strongly that the relationship between dyadic vocalization patterns and age is not an artifact of the presence or absence of nursing activity or the attentional focus of the mother, at least in the home context in which we did our recording. And the predominance of alternation appears to be stable in the present study, as it was in our first

investigation, since it is evident in the eight through the twelfth months as well as in the first five months.

Therefore, our two studies provide reasonably strong grounds for the continued investigation of the protoconversational foundations for the emergence of linguistic competence in the baby, especially since that competence is displayed largely in the discourses in which the baby participates. More concretely, our finding of a transition to a stable predominance of vocal alternation during the fourth month of life indicates the early emergence of turn-taking in vocal activities of the infant-mother dyad. Although even earlier turn taking in other modalities has been reported (Kaye, 1977 [In Schaffer(ed.)], indicates the emergence of a form of turn taking in nursing interaction by 2 weeks), we are not aware of data which display an earlier emergence of alternation predominance in the vocal mode.

As to the apparent inconsistency between our results and the earlier findings by Stern et al (1975), some of the reasons are clear. First, in both of our studies we conducted a systematic and extended investigation of infant-mother vocalization patterns before and after the 3-4 month period focused upon by Stern et al. Additionally, it should be noted that their procedures for establishing an alternation ratio were different from ours. Since our procedure simply counted the number of infant vocalizations which did overlap at all with a mother vocalization, and the number which did not, we are inclined to rely on our own data.

On the other hand, our data should not be taken to imply a transition from a more primitive to a more sophisticated dyadic pattern. In the first place, coactive vocalization continues thoughout life and - as Stern et al argue - probably develops in parallel with alternating vocalization and serves a different function; secondly, in both our own data and those of the Stern group, coactive and alternating vocalization patterns exist at all ages - it is only

their relative dominance which has been shown to shift. However, the shift in relative dominance may reflect functional changes which should be addressed. For example, is the early (pre-transition) alternation pattern regulated in the same manner as the post-transition alternation pattern? That is, is it regulated by control of pause lengths within or between vocalizers, or by control of vocalization lengths? And is early alternation controlled primarily by the mother, with later alternation being controlled or initiated more equally by baby and mother? Moreover, are the regulation mechanisms for coactive vocalizations constant over the development of the dyad? Or are there pre and post-transition changes?

Answers to such questions will shed further light on the complex relationship between early interaction patterns and the later emergence of discourse and linguistic competence in the child. It also is worth emphasizing that the approach taken here, and by many others in this field, is becoming far removed from the more traditional experimental framework which stresses a linear "direction of effects" interpretation of human development. Instead, this approach is much more structural and construes events and processes as being complexly interdependent parts and wholes. As Fogel has put it, "...the demonstration of a complex interdependence of behavior in a single case does suggest new approaches for future work. The use of dyadic concepts like..co-occurrence and co-onset..and turn-taking may lead us away from a 'direction of effects' approach to a more wholistic view of human development in its social context" (1977, p. 150). Such a view is closely compatible with the more recent arguments of Bruner (1976-Herbert Spencer lecture at Oxford), the human action movement in Europe and England (Bruner - "structure of action;" Von Cranach, 1981-Bad Hamburg Conference), and some approaches in this country and in Europe to developmental

and social psychology which stress the structural analysis of episodes of action (Bakeman and Ginsburg, in press; Duncan and Fiske, 1975). We see our on-going work as a continuing part of that perspective.

References

Bakeman, R., & Ginsburg, G.P.
The use of video in the study of human action. In Knorr, K., & Breuner, M. (Ed.) Methods of Social Research: Developments and Advances. London: Academic Press.

Beebe, B., Stern, D., and Jaffe, J.
The Kinesic Rhythm of Mother-Infant Interactions. In Siegman and Feldstein (Eds.), Of Speech and Time, LEA, 24-34, 1978.

Breuner, M. (Ed.)
The Structure of Action. Oxford: Baril Blackwell, 1980.

Bruner, J.S.
The ontogenesis of speech acts. Journal of Child Language, 1975, 2, 1-19.

Bruner, J.
Psychology and the image of man. Herbert Spencer Lecture, Oxford University, 29 October 1976.

Cranach, M.V.
The organization of goal-directed action: A research report. Prepared for Conference. "Discovery Strategies in the Psychology of Action," Bad Hamburg, West Germany, 20-23 January 1981.

Duncan, S., Jr., and Fiske, D.W.
Face to Face Interaction: Research, Methods and Theory. Erlbaum, Hillsdale, N.J.

Fogel, A.
The role of repetition in mother-infant face-to-face interaction. In Schaffer, H.R. (Ed.) Studies in Mother-Infant Interaction. Lander: Academic Press, 1977. Pp. 89-117.

Jaffe, J., and Anderson, S.N.
Communication Rhythms and the Evolution of Language. In Siegman and Feldstein (Ed.), Of Speech and Time, LEA, 17-22, 1978.

Kaye, K.
Toward the origin of dialogue. In Schaffer, H.R. (Ed.) Studies in Mother-Infant Interaction. London: Academic Press, 1977, Pp. 119-151.

Kilbourne, B., and Ginsburg, G.P.
Infant-Mother vocalization patterns in transition. Paper presented at the 61st Annual Meeting of the Western Psychological Association, April 1981.

Stern, D., Jaffe, J., Beebe, B., and Bennett, S.
1975 Vocalizing in unison in alternation: Two modes of communication within the mother-infant dyad. In L. Bloom (Ed.), Readings in Language development, New York: Wiley, 115-127.

Table 1. Indicates the relevant R^2 values for the series of regression equations.

Variables in MRC equation	R^2
Age	.68
Age, $(Age)^2$	.69
Age, $(Age)^2$, $(Age)^3$	.77
Age, Activity	.71
Age, Attention	.68
Age, Activity, Attention	.71
Activity, Attention	.46
Age, Activity, Age x Activity	.73
Age, Attention, Age x Attention	.74
Age, Activity, Attention, Age x Activity, Age x Attention, Age x Activity x Attention	.78
Age, Activity, Attention, Age x Activity, Age x Attention, Age x Activity x Attention, Activity x Attention	.85

Table 2. Shows the Squared Partial Correlations with the Alternation Ratio

Variable correlated with alternation ratio	Variables partialled out	pr^2
Activity	Age	.11
	Attention	.24
	Age, Attention	.09
Attention	Age	.03
	Activity	.007
	Age, Activity	.005
Age	Activity	.47
	Attention	.56
	Activity, Attention	.47

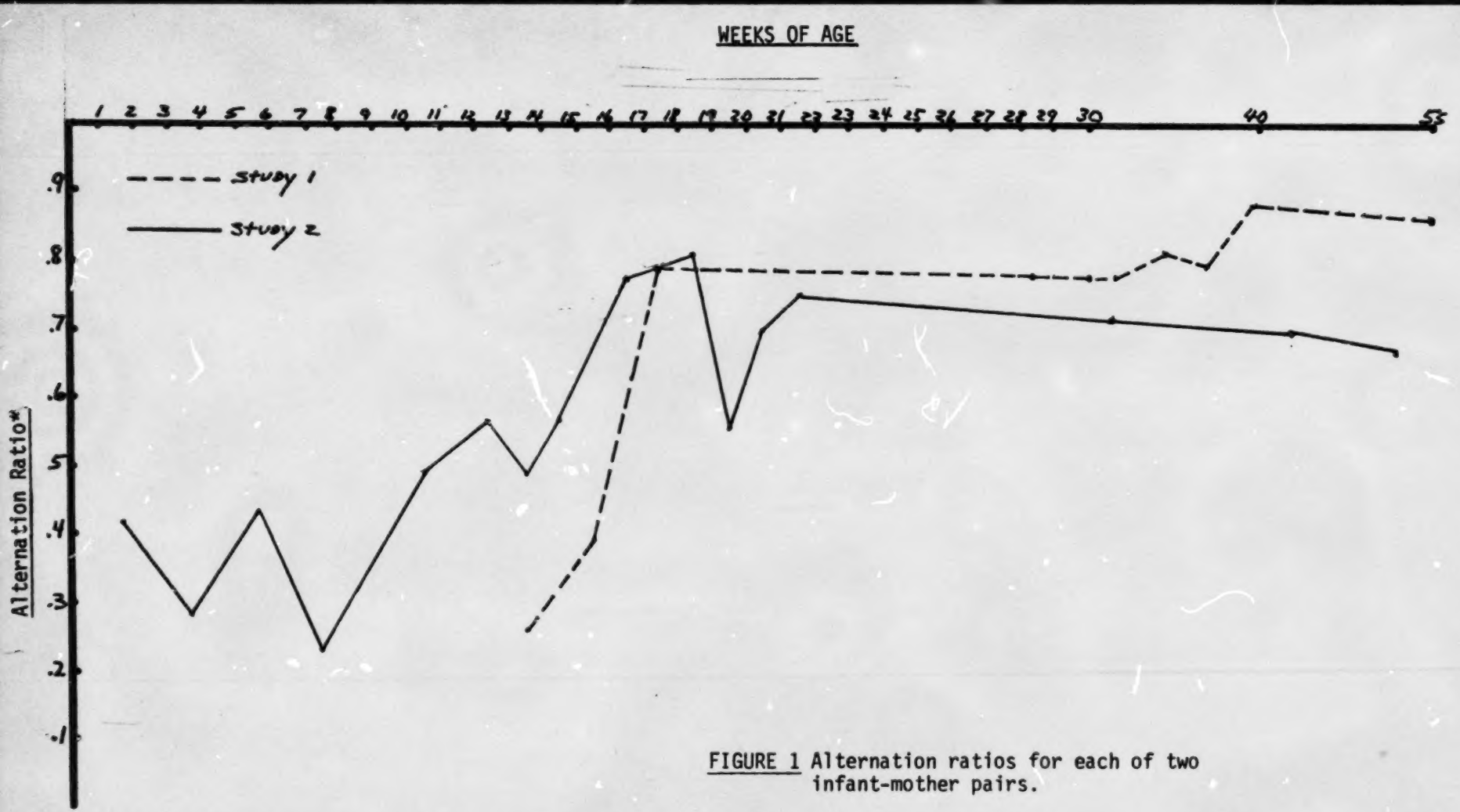

FIGURE 1 Alternation ratios for each of two infant-mother pairs.

*Alternation Ratios: Ratio of infant vocalizations that did not overlap at all with mother's vocalizations to total vocalizations of infant. See text for details.